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June 28, 2006

Receiver: **Examiner Richard J. Lee**
Art Unit: 2613

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Re: Pre-Appeal Brief Request for Review (5 pages)
Notice of Appeal (2 pages)
Application No.: 09/874,587
Attorney Docket No.: CISCP249/4147

Pages Including Cover Sheet: 8

MESSAGE:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Winger

Application No.: 09/874,587

Filed: June 4, 2001

Title: SOURCE ADAPTIVE SYSTEM AND METHOD FOR 2D iDCT

Attorney Docket No.: CISCP249/4147

Examiner: Lee, Richard J.

Art Unit: 2613

Confirmation No.: 5663

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I hereby certify that this correspondence is being transmitted by facsimile to fax number 571-273-8300 to the U.S. Patent and Trademark Office on June 28, 2006.

Signed: Linda L. Quintana
Linda L. Quintana

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Applicant hereby requests review of the rejections in the above-identified application. This request is being filed with a Notice of Appeal. Review is requested for the reasons stated in the accompanying remarks.

REMARKS

The Examiner maintains that neither the last office action response filed March 27, 2006 nor the interview with the undersigned on March 23, 2006 are deemed persuasive to place the present application in condition for allowance because, as stated by the Examiner in the Office Action mailed April 6, 2006, "all the limitations have been previously addressed" in the Final Office Action mailed on March 2, 2006. The Examiner has acknowledged, however, that the amendments to the specification filed on March 27, 2006 do overcome the 35 U.S.C. 112, first paragraph rejections of claims 1-4, 6-13 and 18-21.

Claims 1 and 4 stand rejected under 35 U.S.C. 102(a) as being anticipated by Murata et al (Fast 2D IDCT Implementation with Multimedia Instructions for a Software MPEG2 Decoder), which describes techniques to reduce the execution time for iDCT using MMX instructions (See Introduction). Murata discloses **analyzing the distribution of zero coefficients** for each bit rate and picture type in a data stream, and further teaches an adaptive control method to select iDCT algorithms for sparse blocks **based on the distribution of zero coefficients.** This is in stark contrast to the method and system described in claims 1 and 4 of the present invention,

respectively, which teach selecting from a plurality of iDCT algorithms **<u>based on End of Block (EOB) lengths</u>**.

The Applicants believe that a short description of an End of Block (EOB), followed by a description of an EOB length, would be helpful to the Reviewers. Accordingly, the Applicants respectfully refer the Reviewers to Figure 3 described at page 8 of the specification, which is reproduced below for convenience.

> The difference between the values of a macroblock in a P-frame and the actual frame are grouped together into 8x8 blocks. A spatial transform is then applied to each block of difference values. The spatial transform serves to decompose the 8x8 block into a weighted sum of spatial frequencies. There are 64 spatial frequencies, which may occur in an 8x8 block of data. In the spatial transform, each spatial frequency has a corresponding coefficient. <u>Each coefficient represents the contribution of one of the spatial frequencies in the pattern of the 8x8 block of data</u>. (emphasis added)

The EOB (also referred to as EOB address, EOB marker or EOB value) is simply the highest spatial frequency having a non-zero coefficient, that is, the last spatial frequency present in the macroblock. The **<u>EOB *length*</u>** is derived from a **<u>histogram</u>** of EOB addresses corresponding to a DCT block or an entire shot (a series of frames). The spatial frequency having the highest relative occurrence throughout a DCT block or a shot is defined herein as the EOB length. Figure 3 shows a representative histogram for various scenes having various low to high frequency components (Football, Flower Garden, etc.) having an X-axis corresponding to the EOB length and a Y-axis representing the relative frequency of EOB marker, as shown below.

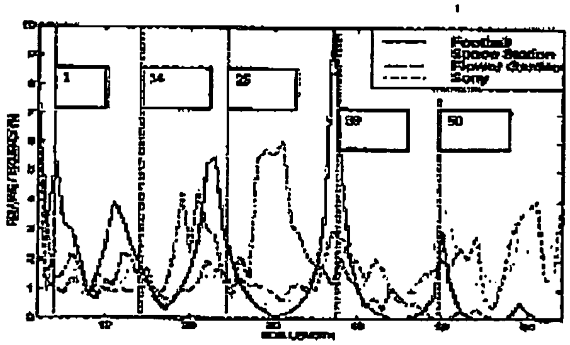

FIGURE 3

It should be noted, as stated on page 16 lines 20-25 and page 17 lines 9-13 of the instant application, that:

> 1) EOB address probability distributions may vary significantly for different video shots and different bit rates. For this reason, the optimal mix of iDCT

routines will vary from shot to shot. A shot is a sequence of frames bounded on each side by a video transition.

2) Within a shot and over spans of a few hundred frames EOB histograms often show little significant variance. Therefore, the optimal mix of iDCT routines remains fairly static within an individual shot. Figure 4 shows superimposed B-frame histograms for the commercially encoded 'DVM Demo' sequence at 4 Mbps.

Therefore, the minimum EOB length is 0 (representing the DC portion of the signal) and the maximum EOB length is 64. This EOB length is, in turn, exploited by the method and system of claims 1 and 4 of the present invention. In this way, blocks not possessing spatial frequencies corresponding to higher bitrates (higher spatial frequencies) do not need to undergo the more complex iDCT algorithms required for blocks that do possess these higher bitrates.

For example, as is shown in Figure 3, the histogram is divided into adjacent sub-regions (bins) of EOB lengths. Each sub-region indicates which iDCT algorithm will be employed by the method/system of the present invention. By way of example, referring to page 18 of the amended specification, "a version of iDCT_high would be selected for an EOB length of 39 or 50. Similarly a version of iDCT_low would be selected for an EOB length of 14 or 25."

For purposes of illustrating the clear error in the Examiner's rejections, claim 1 of the present invention is set forth below. Claim 1 specifically requires:

1. A method for selecting inverse discrete cosine transform (iDCT) algorithms, comprising:

a) examining the coefficients of a DCT block to determine an End of Block (EOB) length;

b) selecting an iDCT algorithm from a plurality of iDCT algorithms <u>**according to the EOB length**</u>; and

c) executing the selected iDCT algorithm.

According to the subject matter of claim 1, a method is described of selecting inverse discrete cosine transform algorithms. The method comprises examining DCT blocks to determine an EOB length. According to the method, <u>**an iDCT algorithm is selected according to the EOB length in the DCT blocks examined**</u>. The selected iDCT algorithm is then executed.

While not the only distinction, the underlined portion in the above paragraph represents a distinction over the cited references that the Applicant has repeatedly argued is not taught, nor suggested by, the cited references. In the Final Office Action mailed March 2, 2006, the Examiner cites Murata pages 3106-3107 sections 2.3-3.1, which merely describes selecting "an IDCT algorithm according to the <u>address</u> of the end of block (EOB) code and the <u>number</u> of nonzero coefficients (pg 3106, column 2, lines 3-4)." The present invention, in contrast, further

generates a histogram of EOB addresses, computes an EOB length according to those EOB addresses, and then selects from a plurality of algorithms according to the EOB length.

The Applicant believes that the Examiner has misinterpreted the present invention with regards to the selection of the iDCT algorithms for blocks of incoming data streams. By way of example, in the Supplemental Response After Final mailed on March 27, 2007, page 8 recites:

> For example, the X axis of both Figures 3 and 4 clearly state "EOB length" indicating the size of the respective EOB macroblock where those macroblocks having a greater length have commensurately more non zero coefficients at higher bitrates. In this way, **by determining a particular EOB length, the invention as recited in claim 1 provides for a selection of a particular iDCT algorithm**. The examples shown in Figure 5 provides that an EOB length of 39 or 50 would be used to select iDCT_high and an EOB length of 14 or 25 would be used to select iDCT_low.

The invention relies upon on the simple and computationally efficient procedure of generating a histogram of EOB length that is then used to select an appropriate iDCT algorithm and not, as required by Murata, relying on generating a distribution of zero coefficients. Therefore, the Applicants believe that claim 1 is neither anticipated nor suggested by Murata.

Independent claim 4 recites essentially the same limitations as claim 1, albeit as a system, and therefore the Applicant asserts that the Examiner is also in clear error with regards to claim 4, as well as all claims dependent on claims 1 and 4.

Independent claims 6 and 11 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Murata et al in view of Singh et al of record (US 2002/0027954 A1), which describes a method and device for reducing the average number of computations required for inverse discrete cosine transform (iDCT) by gathering individual block statistics (specifically dynamic range) during inverse quantization. Nowhere does Singh mention using EOB lengths or generating EOB histograms. The Examiner acknowledges, on page 7 of the Final Office Action mailed March 2, 2006, that,

> Murata et al does not particularly disclose generating a histogram of EOB lengths for a number of B frames corresponding to a shot, wherein the iDCT algorithm is an iDCT low algorithm selected using an EOB histogram of the first B-frame of a shot, wherein the iDCT algorithm is selected by creating an EOB length histogram of the first B-frame of a shot, selecting an iDCT algorithm using an EOB length histogram for B-frames, selecting a selected algorithm using a histogram of EOB lengths for a number of B-frames, and wherein the iDCT algorithm is an iDCT high algorithm available to the method and selected using an EOB histogram of the first B-frame of the shot as claimed in claims 2, 3, 5 (5 has been cancelled), 6, 11, and 21.

Henceforth, the applicant maintains that the Examiner is in clear error in his use of this combination of Murata and Singh, as Singh does nothing to cure the fundamental deficiency of

Murata. Specifically, in the Supplemental Response After Final mailed on March 27, 2007, page 8 recites:

> At paragraph [0007], Singh classifies the input data blocks into a small number of classes **based on the location and frequency of sub-blocks (within the input data block) having non-zero valued DCT coefficients** where each data block falls into one of the classes. For each class, an iDCT algorithm that best exploits the pattern of non-zero sub-blocks of that class is then selected. Furthermore, at paragraph [0010], "the classification of the blocks is based on the location, within the 8 x 8 block, of the sub-blocks that contain non-zero DCT coefficients". **Therefore, Singh characterizes each input data block based upon a predetermined pattern of sub-blocks having non-zero valued DCT coefficients. Based upon this characterization, an appropriate iDCT algorithm is selected for that particular data block based on the pattern of sub-blocks**. Furthermore, since each DCT data block must be characterized in order to assign the appropriate iDCT algorithm, Singh requires a substantial commitment of computational resources.

Again, in contrast to Singh, the present invention as recited in all of the claims teaches determining an EOB length for the entire data block and then **based upon the EOB length** for the data block, a particular iDCT algorithm is selected that is optimized for that particular **EOB length**.

Accordingly, the Applicant believes that the Examiner is in clear error with respect to his use of Singh in combination with Murata, since Singh does nothing to cure the admitted deficiencies of Murata.

In addition, for the purpose of this PRE-APPEAL BRIEF REQUEST FOR REVIEW only, the Applicant respectfully submits that the Examiner is in clear error with respect to the rejection of the dependent claims for reasons similar to the reasons that the rejection of the corresponding independent claims are in clear error.

CONCLUSION

It is respectfully submitted that Examiner's rejections are in clear error and that this application is in condition for allowance. Notice to that effect is earnestly solicited.

Respectfully submitted,
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